LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	The Assessment of Groundwater Vulnerability towards Contamination using the DRASTIC and NV Indexes in Banjarbaru City, South Borneo, Indonesia		
Jumlah Penulis	:	2 orang (Firza Syarifa Zahra, **Thomas Triadi Putranto***)		
Status Pengusul	:	penulis ke-2 (Penulis Korespondensi)		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Indonesian Journal of Geography
		b. Nomor ISSN	:	ISSN 2354-9114 (online), ISSN 0024-9521 (print)
		c. Vol, No., Bln Thn	:	Vol 53, No 3 (2021)
		d. Penerbit	:	Gadjah Mada University
		e. DOI artikel (jika ada)	:	https://doi.org/10.22146/ijg.66716
		f. Alamat web jurnal	:	https://journal.ugm.ac.id/ijg/article/view/66716
		Alamat Artikel	:	https://journal.ugm.ac.id/ijg/article/view/66716/pdf
		g. Terindex	:	Scopus, Q3

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Reviewer 1

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Sebagai Catatan dari Tim PAK fakultas nilai diturunkan menjadi 32

Prof Dr. TUTUK DJOKO K.
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2. **Ruang lingkup dan kedalaman pembahasan:**
   Pembahasan dalam paper ditulis secara detil dan mendalam. Paper membahas tentang kerentanan airtanah menggunakan metode DRASTIC dan Nitrat Index di Kota Banjarbaru dan sekitarnya. Data primer lapangan sangat lengkap (150 titik sumur, 11 titik geolistrik dan 10 pumping test. Hasil analisis kerentanan air tanah metode DRASTIC dikerjakan secara spasial dan divalidasi menggunakan data kimia, namun hanya diambil 1 musim dan jumlah sampel masih kurang (hanya 10 sampel) untuk area seluas sekitar 2.500 km^2. Peta-peta tematik dan tabel disajikan dengan sangat jelas untuk mendukung pembahasan.
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Semarang, 9-6-2022
Reviewer 1

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b. Ruang lingkup dan kedalaman pembahasan (30%)	12,00			11,00
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Total = (100%)	**40,00**			**36,25**
Nilai Pengusul = (50% x 36,25) = 18,13.				

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Semarang, 14 Juni 2022
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Indonesian Journal of Geography • *Open Access* • Volume 53, Issue 3, Pages 360 - 372 • 2021

Document type
Article • *Gold Open Access*

Source type
Journal

ISSN
00249521

DOI
10.22146/ijg.66716

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The Assessment of Groundwater Vulnerability towards Contamination using the DRASTIC and NV Indexes in Banjarbaru City, South Borneo, Indonesia

Zahra, Firza Syarifa[a]; Putranto, Thomas Triadi[b]

Save all to author list

[a] Graduate School of Environmental Science, Diponegoro University, Indonesia

[b] Geological Engineering Department, Diponegoro University, Indonesia

Abstract

The current excessive use of groundwater is exacerbated by human activities, which directly or indirectly trigger surface pollution and gradually affect to the subsurface, including groundwater . Indonesia is one of the developing countries that encounter these obstacles, specifically Banjarbaru City in South Kalimantan Province and its surroundings. Hence, proper management is needed to maintain the sustainable function of groundwater , such as by determining its vulnerability index to pollution. This study used geospatial analysis to determine the intrinsic and extrinsic vulnerability of groundwater via the DRASTIC and NV index methods, respectively, through visual representations on a map. The validation involved the distribution of nitrate and nitrite values to review the relationship between vulnerability levels and the presence of anthropogenic influences. Subsequently,

Source details

Indonesian Journal of Geography

Open Access

Scopus coverage years: from 1976 to 1984, from 1986 to 1987, from 1990 to 1992, from 1994 to 1997, from 2015 to 2021

Publisher: Gadjah Mada University

ISSN: 0024-9521

Subject area: Social Sciences: Geography, Planning and Development

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INDONESIAN JOURNAL OF GEOGRAPHY
ISSN 2354-9114(print) ISSN 0024-9521(online) http://jurnal.ugm.ac.id/ijg

Indonesian Journal of Geography

Current Volume: 54, Issue No. 1, 2022

Indonesian Journal of Geography ISSN 2354-9114 (online), ISSN 0024-9521 (print) is an international journal published by the Faculty of Geography, Universitas Gadjah Mada in collaboration with The Indonesian Geographers Association. Our scope of publications includes physical geography, human geography, regional planning and development, cartography, remote sensing, geographic information system, and environmental science.

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ISSN 2354-9114 (online), ISSN 0024-9521 (print)

INDONESIAN JOURNAL OF GEOGRAPHY
ISSN 2354-9114(print) ISSN 0024-9521(online) http://jurnal.ugm.ac.id/ijg

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ISSN 2354-9114 (online), ISSN 0024-9521 (print)

00606607 IJG STATISTIC

ISSN 2354-9114 (online), ISSN 0024-9521 (print)
Indonesian Journal of Geography Vol.53 , No. 3, 2021 (360 – 372)
DOI: http://dx.doi.org/10.22146/ijg.66716 website: https://jurnal.ugm.ac.id/ijg

INDONESIAN JOURNAL OF GEOGRAPHY

RESEARCH ARTICLE

The Assessment of Groundwater Vulnerability towards Contamination using the DRASTIC and NV Indexes in Banjarbaru City, South Borneo, Indonesia

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[2]Geological Engineering Department, Diponegoro University, Indonesia

Received: 2021-08-04
Accepted: 2021-11-05

Keywords:
groundwater vulnerability; contamination; DRASTIC; NV; nitrate and nitrite

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Abstract. The current excessive use of groundwater is exacerbated by human activities, which directly or indirectly trigger surface pollution and gradually affect to the subsurface, including groundwater. Indonesia is one of the developing countries that encounter these obstacles, specifically Banjarbaru City in South Kalimantan Province and its surroundings. Hence, proper management is needed to maintain the sustainable function of groundwater, such as by determining its vulnerability index to pollution. This study used geospatial analysis to determine the intrinsic and extrinsic vulnerability of groundwater via the DRASTIC and NV index methods, respectively, through visual representations on a map. The validation involved the distribution of nitrate and nitrite values to review the relationship between vulnerability levels and the presence of anthropogenic influences. Subsequently, the results of the DRASTIC method showed that the study area is included in three vulnerability indexes, namely low (95-120), medium (120-160), and high (160-186). The NV method further indicated that the groundwater vulnerability indices are divided into four, namely very low (21.2-70), low (70-110), moderate (110-150), and high (150-186). Based on the results, the use of specific vulnerabilities was considered more effective than the intrinsic technique in determining the vulnerability index because the NV method considers land use as a parameter to provide more detailed outcomes.

1. Introduction

Water is a basic need for living things and a source of life for humans. Although this highlights the importance of the availability of groundwater as it is a source of freshwater, its quantity and amount are decreasing daily (Alexander et al., 2017). Inadequate water supply is one of the major challenges in developing countries (Sorlini et al., 2013), as well as the insufficient quality of groundwater, which is a source of clean water. Hence, the poor groundwater quality is a huge problem (Miglietta et al., 2017), including in the study area selected. Groundwater availability is seriously affected by overexploitation, pollution, and climate change (Taylor et al., 2013; Gorelick and Zheng, 2015; Lasagna et al., 2019; Lasagna et al., 2020; Grappein et al., 2021). Besides these problems, many factors influence the decline in quantity and quality, including excessive groundwater extraction and human activity (Putranto and Syah, 2018).

The decrease in groundwater quality can occur due to pollution, which can be described as the poor of a state due to the entry of pollutants (Palar, 2004). Groundwater pollution is a result of several factors, including human activities (Mohammad, 2017), such as pesticide usage in agriculture, household waste, or industrial activities (Kesuma et al., 2017). This contamination often occurs in areas with high population density, industries, and agricultural activities, where it is frequently used as a freshwater source.

Consequently, assessments to prevent contamination are more effective than improving the quality of polluted groundwater (Machdar et al., 2018). Vulnerability is an intrinsic or natural characteristic of groundwater that depends on the system's sensitivity to natural and/or human impacts (Hendrayana, 2011). It is defined as the risk of pollution due to the potential impact of land use. As a result, assessments show that the protection provided by the environment varies across locations (Abdullahi, 2009). Groundwater vulnerability comprises two main ideas, namely intrinsic vulnerability, which is based on an area's hydrogeological characteristics and geological conditions. This aspect depends on three main factors, namely the absorption process and travel time of fluid contaminants, their flow dynamics in the saturated zone, and the concentration of the remaining contaminants upon reaching this zone (Maria, 2018). The second aspect is the specific vulnerability, which refers to the vulnerability of groundwater to specific contaminants generated by human activities.

The intrinsic vulnerability method most often used is the DRASTIC index, initially introduced by the United States Environmental Protection Agency (USEPA) (Aller et al., 1987). Conversely, there are many specific vulnerability methods, including the NV index, which is considered capable of producing a higher level of accuracy with a focus on nitrate as a pollutant (Martinez-Bastilda et al., 2010).

ISSN 2354-9114 (online), ISSN 0024-9521 (print)
Indonesian Journal of Geography Vol.53 , No. 3, 2021 (318–327)
DOI: http://dx.doi.org/10.22146/ijg.66716 website: https://jurnal.ugm.ac.id/ijg

INDONESIAN JOURNAL OF GEOGRAPHY

RESEARCH ARTICLE

Geospatial Analysis of Hydrometeorological Dynamics for Managing Socio-economic and COVID-19 Threats in the Ossiomo Watershed, Nigeria

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Received: 2020-12-12
Accepted: 2021-06-08

Keywords:
Catchment discharge;
COVID-19;
Dam;
Hydroelectric power, Precipitation;
Watershed.

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Abstract. The geographical occurrence and diffusion of the current COVID-19 pandemic is partly a function of the awareness, socio-economic dynamics, mobility, and health management practices in place. In Nigeria, the first confirmed case of the COVID-19 pandemic was proclaimed on February 27, 2020, in which an Italian citizen was tested positive for the virus in Lagos. Ossiomo watershed in Edo State, Nigeria, is mainly a rural region with limited healthcare access and abundant rains and surface water flowing in different drainage networks. The highly contagious and pathogenic COVID-19 disease, requires effective management of available water resources for sustainable health development. This is because one of the recommendations for preventing COVID-19 is washing hands with soap using running water. In most rural Africa, including Ossiomo, healthcare facilities are inadequate and no sustainable pipe-borne water except rain harvesting for survival. Using Inverse Distance Weighted (IDW) Geographic Information System (GIS) interpolation technique, the rainfall map produced (derived from a 31-year collated geo-coded hydrometeorological data - rainfall and discharge, covering the Ossiomo watershed) shows that rainfall decreases northward with minimum monthly precipitation of 18.8mm in January and to the south with a mean maximum rainfall of 339.0mm in July. NCDC records on Covid-19 were used to create Choropleth maps that revealed very low confirmed cases and relatively moderate-high deaths, though considered relatively low when compared to global statistics. The Pearson Product Moment Correlation Coefficient (PPMCC) further indicates a strong correlation between rainfall and drainage discharge with r=0.717. With sustainable socio-economic activities and adequate water supply, coupled with effective COVID-19 management practices, the pandemic may not linger in the study area.

1.Introduction

Besides massive unemployment, the dearth of food remains a challenge in developing countries, especially in rural regions (Egwue *et al.,* 2020; Carreras *et al.,* 2020). This is because, home confinement or reduced mobility and transportation in many African countries, have altered domestic food production (Francesconi *et al.,* 2021). In rural Africa, like the Ossiomo watershed in Edo State, Nigeria, access to government pipe-borne water is a luxury; hence, the continued reliance on rain harvesting and available stream waters by the rural poor. Since one of the management practices for COVID-19 is the washing of hands with water: viz-a-viz keeping to non-pharmaceutical protocols, it became very expedient to study the hydrometeorological water sources in Ossiomo watershed in order to ascertain the potentials in rain harvesting and surface drainage discharge as panaceas for managing COVID-19 in a typical rural Africa geographic area.

Previously, a comparative assessment of freshwater resources by the World Meteorological Organization (WMO, 1997) reckoned that about 2/3 of the world's population would be inhabiting in water-distressed countries by 2025 (Babatolu and Akinnubi, 2014). As observed by Cecchini (2020), 47% of the global population will encounter water paucity by 2030. Corona virus disease (COVID-19) suggests that yearnings for rapid development should not destroy our planet. Literature further reveals that COVID-19 is a highly communicable and infective viral ethological process caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), that emanated from Wuhan in China, and which then spread round the globe (Shereen, Khan, Kazmi, Bashir, and Siddique, 2020). Without adequate water provisions in quality and quantity, the disease may linger as a major pandemic globally because, as noted by World Health Organization (WHO, 2020), 20 seconds of washing of hands in running water, social distancing, wearing a surgical mask, among others, as some of the ways to prevent and possibly slow the spread of the disease. Implicitly, the availability of water is germane and central to the containment of COVID-19. However, it has also been observed that most persons infected with COVID-19 virus often have mild-to-moderate respiratory malady and get well without receiving special treatment, while older population in addition to those with underlying medical ailments such as diabetes, respiratory disorder, degenerative cardiovascular disease, and cancer are susceptible to severe illness (WHO, 2020). As noted by the Nigerian Centre for Disease Control (NCDC, 2020), Nigeria recorded its first instance of Covid-19 in Lagos State, Nigeria on February 27, 2020. Francesconi *et al.,* (2021) noted that (except for South Africa) regardless of whether or not the statistics of COVID-19 infections recorded from Africa is relatively lower, concerns are on the increase with respect to how the pandemic will impact the fragile food systems

ISSN 2354-9114 (online), ISSN 0024-9521 (print)
Indonesian Journal of Geography Vol.53 , No. 3, 2021 (340–347)
DOI: http://dx.doi.org/10.22146/ijg.64991 website: https://jurnal.ugm.ac.id/ijg

INDONESIAN JOURNAL OF GEOGRAPHY

RESEARCH ARTICLE

Urban Planning in Al-Madinah Al-Munawarah using New Green Spaces Modelling through GIS Application

Aljohani Nadiyah Mazi[1*], Mokhtar Jaafar[2] and Lam Kuok Choy[3]
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Received: 2021-05-01
Accepted: 2021-05-01

Keywords:
green spaces,;
urban planning;
public parks;
mental health;
Al-Madinah Al-Munawarah

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Abstract. The present study investigated the new green spaces modelling in Al-Madinah Al-Munawarah using GIS application. It adopted the mental health theory as a theoretical framework. The data of the study was collected through two data collection instruments, namely, questionnaire as well as interview. The quantitative data was analysed through SPSS software while the qualitative data collected from the interviews was qualitatively analysed using thematic content analysis. The findings of the study revealed the most suitable model for potential new green spaces using GIS analysis (descriptive summaries) for urban planning in Al-Madinah Al-Munawarah is Quba (25.5%). Moreover, the most prominent challenge facing the design of a new green space in Al-Medinah Al-Munawarah, Saudi Arabia, is the weakness of the budget allocated to designing green spaces (86.7%). It is also shown that the most prominent benefits of designing new green spaces for the residents of Al-Madinah Al-Munawarah are the provision of seats and seating areas. Therefore, the participants stress the importance of taking into account the provision of seats and seating places when designing green spaces (93.3%). In terms of the potential of developing urban green spaces in Al-Madinah Al -Munawarah, the majority of the respondents believe that urban green spaces can be developed, to a large degree, in Al-Madinah Al-Munawarah in the future. Therefore, the study recommends that urban green spaces should be developed in Al-Madinah Al-Munawarah and the budget allocated to designing green spaces in Al-Madinah Al-Munawarah should be also increased. This study could be considered as a guideline for future development that can be used by government in Saudi Arabia.

1. Introduction

Green space has a great impact on human development. Literature (e.g. McPhearson et al., 2015; Vieira et al., 2018) revealed that green space with flowers and trees have their positive impact on humans. For instance, green space might decrease human tensions and spread the psychological peace among them. Besides, it is maintained that the green space reduces the desert areas in cities (Al-Ballaa et al., 2012) and increases the productivity of employees (Mytton et al., 2012). It also gives a sense of revitalization as a result of reducing boredom resulting from the urban planning as well as fixed lines of buildings and walls (Barbosa et al., 2007). Moreover, Barton and Pretty (2010) claimed that green space minimizes the negative impact of urbanization and improves the people and employees' physical and mental activities.

Furthermore, the green space has become essential in the governmental building and any formal places. Mytton (2012) reveals that the productivity of the employee has been increased if the workplace has permeant greenery and beautiful landscape. The green space gives a sense of revitalization as a result of reducing boredom resulting from the urban planning and fixed lines of buildings and walls (Barbosa, 2007). In this respect, Barton (2010) contended that green space reduces the negative effects of urbanization and improves the physical and mental activities of people and employees as well. Hillsdon (2009) explores that green space also allows providing huge socioeconomic benefits like restitution. Green space also encourages to attract more tourist to visit parks. Onder (2011) reveals that the annual revenues of the tourism sector will be increasing due to the spread of green space.It is worth mentioning that as cities grow, changes in urban land cover as well as geometry, morphology and architecture coupled with intensifying human activities have led to a modified thermal climate (Neema & Ohgai, 2013; Safrilia & Poerwoningsih, 2021). Al-Madinah Al-Munawarah was not planned around a goal of ecological resilience; this includes less early planning in terms of green spaces, parks, and other natural resources. Furthermore, Al-Madinah Al-Munawarah has been listed as one of the fastest-growing cities in Saudi Arabia, with new industries and jobs being moved to the Al-Madinah Al-Munawarah area (Metwaly et al., 2021). This urban growth appears to be on a trajectory to continue, leading to an increased need to provide reasonable access to green spaces for all residents.

The demand of green space has increased in Al-Madinah Al-Munawarah due to the increase in the population destiny. Therefore, establishing new cities in Al-Madinah Al-Munawarah is the main goal of the Saudi authorities (The Report Saudi Arabia, 2020) and therefore, there should be adequate financial support allocated for reaching this aim. More importantly, the current status of new cities in Al-Madinah Al-Munawarah is unplanned due to the destiny of